

**REMARKS**

Claims 1-31 are currently pending in the application. Claim 5 is canceled. Claims 1, 6, 7, 21, 22, and 25 are amended. The amendments to claims 1, 6, 7, 21, 22, and 25 have been made to incorporate the limitation of claim 5. The amendments find support in the specification and are discussed in the relevant sections below. No new matter is added.

**Rejection of claims 1-4, 9-25, and 28-31 under 35 U.S.C. §102(b)**

Claims 1-4, 9-25, and 28-31 are rejected under 35 U.S.C. §102(b) for alleged anticipation by Ghias et al. (U.S. Patent No. 5,874,686). The Examiner states that the Ghias et al. reference discloses all of the elements of the claimed invention. Applicants respectfully traverse the rejection.

Claim 1 and dependent claims 2-4, 9-20, 28-31, as well as claim 23 and dependent claim 24, all include the limitation of “search criteria comprising a tune as a **sequence of melodic intervals**” (emphasis added). Claim 25 recites “an apparatus for determining a **sequence of melodic intervals**” (emphasis added). Claims 21 and 22 as amended recite “an apparatus for indexing a music database” that includes the step of “applying criteria to identify portions of the files likely to contain tunes wherein said criteria comprise a tune as a **sequence of melodic intervals**” (emphasis added). The instant specification defines “melodic intervals” at page 7, lines 13-14, as “the pitch interval between a note and a preceding note.” The term “interval” is not defined in the specification, but instead has its ordinary, art-accepted meaning, namely “the distance in pitch between two notes” or the “ratio of frequencies of the two notes” (see music dictionary definitions of interval provided as exhibits A and B filed with Applicants’ response of March 3, 2004).

As discussed in Applicant’s previously filed amendment and response of February 6, 2004, unlike Applicants’ invention, the Ghias et al. reference discloses a method of searching music files using *relative pitch transitions between successive notes* (col. 3, lines 8-20). Each note is given a designation as being the same pitch as the previous note (S), a higher pitch than the previous note (U), or a lower pitch than the previous note (D), thereby converting the melody

of the song into a sequence of letters using S, U, and D. Inputs are converted into this sequence of pitch changes or pitch transitions, and the songs stored in the database (in the pitch transition format) are preprocessed and converted into the same format (column 5, line 66). Once the pitch has been determined or approximated, the sequence of relative pitch transitions is compared with corresponding sequences of pitch transitions in the database.

The Examiner asserts that Applicants asserted dictionary definition is encompasses by the teaching of Ghias et al. that “a melody is inputted into a computer...representations of relative pitch differences between successive notes.” Applicants submit that there is a fundamental difference between determining a relative pitch difference (that is, whether a pitch difference exists between successive notes) and determining the melodic interval; i.e., determining what the difference in pitch actually is. Said differently, Ghias et al. teaches determining whether there is a difference between successive pitches, and the present claims relate to determining what the difference is. It is clear, therefore that the instant claims are distinct over the teachings of Ghias et al.

Nevertheless, without acquiescing to the Examiner’s rejection, and solely for the purpose of expediting prosecution, Applicants have amended claims 1, 6, 7, 21, 22, and 25 herein to further distinguish over Ghias et al. Claims 1, 6, 7, 21, 22, and 25 have been amended to incorporate the limitation of claim 5 (now cancelled) that the input means further include “quantization means to determine a closest chromatic interval, a closest whole tone interval, or a closest minor third interval between two successive musical pitches in the sequence of melodic intervals.” Again, all Ghias et al. teach is for a given tone, determining whether the previous tone was a lower, higher, or the same pitch, and does not teach determining what the difference in pitch is. As amended, the instant claims, distinguish further still over Ghias et al. by requiring a determination of a closest chromatic interval, closest whole tone interval, or a closest minor third interval between successive pitches in the sequence of melodic intervals.

Applicants therefore submit that Ghias et al. do not teach each element of the claimed invention and do not anticipate the claimed invention. Applicants accordingly request that the rejection be reconsidered and withdrawn.

**Rejection of Claims 5, 6, 7, 8, 26, and 27 under 35 U.S.C. §103(a)**

Claims 5-7 are rejected under 35 U.S.C. 103(a) for allegedly being unpatentable over Ghias et al. in view of Zimmerman (U.S. Patent No. 5,563,358). Claims 26 and 27 are rejected under 35 U.S.C. 103(a) for allegedly being unpatentable over Ghias et al. in view of Lybrook et al. (U.S. Patent No. 4,731,847). Claim 8 is rejected under 35 U.S.C. 103(a) for allegedly being unpatentable over Ghias et al. Applicants respectfully traverse this rejection.

**Ghias et al. and Zimmerman**

The Examiner asserts that Ghias et al. do not teach determining a chromatic interval, but that “Zimmerman et al. disclose teaching or training means, wherein said input means further includes quantization means to determine a closest chromatic interval, a closest whole tone interval, or a closest minor or major third interval between two successive musical pitches . . . it would have been obvious to one of ordinary skill in the art . . . to utilize the teachings of Zimmerman with the apparatus of Ghias et al. because Zimmerman et al. provide the teachings of using a chromatic interval as part of comparing and pitch matching techniques which provides more information for providing a match in melodies or tunes.”

Zimmerman is directed to using a chromatic interval for comparing and matching pitch as part of the musical instruction of a student. The chromatic interval being calculated is relative to the pitch of the tonic, the first note of the scale (Col. 9, Line 13). Zimmerman et al. does not teach or suggest “an apparatus for searching a database of music files, comprising input means to provide search criteria comprising a tune as a sequence of melodic intervals,” as required by claims 5-7 of the instant application.

For the reasons described below, Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness under the requirements of 35 U.S.C. § 103(a). To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings (*In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)).

Second, there must be a reasonable expectation of success. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicants' disclosure. Finally, the prior art reference (or references when combined) must teach or suggest *all the claim limitations*. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974).

Applicants submit that even if the Ghias et al. reference is combined with the Zimmerman et al. reference, the two disclosures do not provide the invention as claimed in claims 5-7. That is, the recited combination lacks essential elements of the claimed invention.

The recited combination of references does not disclose "an apparatus for searching a database of music files, comprising input means to provide search criteria comprising a tune as a sequence of melodic intervals," nor does it disclose "an apparatus for searching a database of music files, comprising input means to provide search criteria comprising a tune as a sequence of melodic intervals."

#### *Claim 5*

While claim 5 is no longer pending, thus rendering this rejection moot as to that claim, Applicants provide the following remarks with respect to the subject matter of claim 5 which as been incorporated into the independent claims of the invention.

Zimmerman does not teach "*quantization means for determining a closest chromatic interval, a closest whole tone interval, or a closest minor or major third interval between two successive musical pitches*".

Zimmerman, in contrast, is directed to a completely different function than the present invention. Zimmerman teaches a music training system in which the purpose of the device is to indicate how closely to a target *monophonic reference source* a student is managing to play or sing a note. For each note in a sequence of notes, the student endeavors to perform with a note that matches the note played by the training system. The note played by the training system is the *monophonic reference source* (see column 5, lines 31 and 32). The student tries to perform matching to this reference.

The interval determination provided by the training system of Zimmerman ('SHOW INTERVALS' function) is solely for the purpose of visually displaying an interval relative to the *monophonic reference source* as the tonic (column 9, lines 52 to 58). If no pitch is present in the monophonic reference channel when the 'SHOW INTERVALS' button is pressed, then the previously stored tonic (monotonic reference source) is used. Thus, there is no teaching whatsoever of "*quantization means for determining a closest chromatic interval, a closest whole tone interval, or a closest minor or major third interval between two successive musical pitches in the sequence of melodic intervals*" as claimed in revised claim 5.

The passage referred to by the Examiner (column 9, lines 1 to 28) appears merely to specify how an interval may be calculated. The second passage of Zimmerman referred to by the Examiner (column 16, line 44 *et seq*) refers to the functions performed by the waveform analyser 56 (Figures 2 and 5, see column 15, line 63) or by the waveform analyser 65 (Figure 2) which is described as being identical to the waveform analyser 56 (see column 11, lines 37 and 38).

The analyser 56 processes the monophonic reference channel 55 (Figure 2) while the analyser 65 processes the student sample channel from pre-amp 64 (Figure 2). The identified passage merely specifies that the waveform being analysed in either channel may be converted/allocated to the nearest semitone in the conventional Western scale of approximately 100 semitones. There is no discussion of any purpose for this activity; it seems most likely that its purpose is to allow display of the reference waveform and/or student sample waveform as a note on a conventional musical stave. There is, again, no suggestion of "*quantization means for determining a closest chromatic interval, a closest whole tone interval or a closest minor or major third interval between two successive musical pitches in the sequence of melodic intervals*" as claimed in claim 5.

Thus, Ghias et al. and Zimmerman do not, either alone or together, teach each element of the claimed invention. Applicants therefore request that the rejection be reconsidered and withdrawn.

*Claim 6*

It will be equally apparent that, since there is no discussion in Zimmerman of any comparison of successive musical pitches in a sequence, the document does not teach or suggest “*quantization means for determining a closest major, minor or other scale to which successive musical pitches of the sequence of melodic intervals will fit*”, as claimed in claim 6.

The various functions of the quantization means of the present invention, in processing the sequence of melodic intervals of the input search criteria significantly improve the subsequent matching capability of the comparing means, as discussed in the specification in the sections entitled “*Quantization of audio input*” and “*Note discretization*”.

Applicants have reviewed the passages cited by the Examiner which allegedly provide the limitation recited in claim 6 and can find no teaching of quantization means for determining a closest major, minor or other scale to which successive musical pitches of the sequence of melodic intervals will fit. To the extent that the Examiner maintains this rejection, Applicants request that the Examiner indicate the specific teachings of Zimmerman which provide such quantization means.

Accordingly, Applicants submit that when combined, Ghias et al. and Zimmerman do not teach each element of the invention recited in claim 6, and request that the rejection be withdrawn.

*Claim 7*

There is likewise no teaching in Zimmerman of means to determine, from the sequence of melodic intervals, a succession of rhythmic intervals and to use this succession of rhythmic intervals as further search criteria. The Examiner cites passages in Zimmerman that allegedly provide this teaching but, as noted above, Applicants have reviewed these passages and can find no teaching of determining a succession of rhythmic intervals which are used as search criteria. Accordingly, the teachings of Zimmerman combined with Ghias et al. do not teach each element of claim 7.

In the event that the Examiner maintains this rejection of claim 7, Applicants respectfully request that the Examiner point out the specific teachings of Zimmerman which provide means for determining a succession of rhythmic intervals and the use of the succession of rhythmic intervals as search criteria.

*Lack of Motivation*

To reject a claim under 35 U.S.C. §103, in addition to teaching all the elements of the claimed invention, the combination of references must be suggested, either implicitly or explicitly, by the references themselves; one of skill in the art must find motivation in one or more of the references to combine the teachings therein. Applicants submit that no such motivation is found in either Ghias et al. or Zimmerman. Unlike cases in which motivation to combine reference is established where the reference teachings are directed to solving the same problem (See, e.g., *Ruiz v. A.B. Chance Co.*, 357 F.3d 1270 (Fed. Cir. 2004)), the references cited against the instant claims relate to two completely unrelated technologies. Ghias et al. relates to a method for digitizing a melody to be searched against a melody database. Zimmerman teaches a musical training apparatus which provides feedback to a student as to whether the notes they are playing or singing are the same as a reference note. Zimmerman does not teach or even suggest utilizing the input provided by the student to search a melody database. Likewise, Ghias et al. does not teach or suggest that the searching method taught therein would be adaptable as a training aid. One of skill in the art, given the teachings provided by each of Ghias et al. and Zimmerman would not have been motivated to combine the teachings therein to produce the claimed invention. Moreover, even if combined (as described above), the references do not teach each element of the claimed invention.

Ghias et al. and Lybrook et al.

The Examiner has rejected claim 8 as being obvious over the combination of Ghias et al. and Lybrook et al. The Examiner states that “Lybrook et al. disclose an apparatus, including means...to provide as input additional search criteria comprising text information...it would have been obvious to one of ordinary skill in the art ...to utilize the teachings [of] Lybrook et al.

with the teachings of Ghias et al., because the teachings allow for an alternative input, wherein text can be used as an input to the system.” Applicants respectfully traverse the rejection.

Unlike the present invention, the Lybrook reference discloses a synthesizer to simulate a song based on the input of the user. The allophone rules 103 in Fig. 1 are used in combination with the text input of text material 101 to generate a sequence of allophones (Col. 3, Line 41) to generate sound. Even if combined with the teachings of Ghias et al., the combination would not teach each element of the claimed invention. Lybrook et al. and Ghias et al., taken alone or together, fail to teach does not teach or suggest “an apparatus for searching a database of music files, comprising input means to provide search criteria comprising a tune as a sequence of melodic intervals, wherein the input means includes quantization means to determine a closest chromatic interval, a closest whole tone interval, or a closest minor or major third interval between two successive musical pitches in the sequence of melodic intervals” as required by claim 8 of the instant application.

Thus, because the teachings of Ghias et al. and Lybrook, even if combined, do not provide all the limitations of the claimed invention, claim 8 is not obvious over the combination. Applicants therefore request that the rejection be reconsidered and withdrawn.

Ghias et al.

The Examiner has rejected claims 26 and 27 as being obvious over Ghias et al. The Examiner asserts that although Ghias et al. does not teach means for designating the gradient of each element as one of the categories selected from the group consisting of horizontal/near horizontal; diagonal; and vertical/non-vertical; and means for coalescing adjacent elements of the same category to form compound elements, these aspects were well known in the art and thus, it would have been obvious to use the well known teachings in the art with the apparatus of Ghias et al. Applicants respectfully traverse the rejection.

At the outset, Applicants note that the Examiner has made an assertion that the teachings of gradients and means for coalescing adjacent elements are well known in the art, but has not provided and support for this statement. Regardless, however, even if the Ghias et al. reference



is combined with what is known in the art regarding the use of gradient and related components for determining points or comparison of an input signal over a period of time, the recited combination does not disclose, "an apparatus for searching a database of music files, comprising input means to provide search criteria comprising a tune as a sequence of melodic intervals, wherein the input means includes quantization means to determine a closest chromatic interval, a closest whole tone interval, or a closest minor or major third interval between two successive musical pitches in the sequence of melodic intervals."

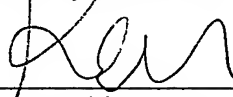
Therefore, because the combination of Ghias et al. and the well known teachings in the art does not provide each element of the claimed invention, the instant claims are not obvious over this combination.

Applicants submit that in view of the foregoing remarks, all issues relevant to patentability raised in the Office Action have been addressed. Applicants respectfully request the withdrawal of rejections over the claims of the present invention.

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